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CONTENTS

Commercial Standards Monthly.
Twenty-Second National Conference on Weights and Measures.
Conference of State utility commission engineers.
Spectrum of chlorine.
New method for determining gasoline content of natural gas.
Volatility data on natural gasoline and blended fuels.
Fire-hazard test of wooden laboratory table.
Effect of acidity of paper.
Spotting of plated or finished metals.
Reference laboratory for Portland cement.
Improved chinaware-testing machine.
Change of volume during use of burned clay bodies.
Directory of governmental testing laboratories.
Radio signal transmissions of standard frequency, July to December.
New and revised publications issued during May, 1929.
Recent articles appearing in outside publications.

COMMERCIAL STANDARDS MONTHLY

For over four years the progress of work in the field of commercial standardization has been recorded in a multigraphed periodical known as the Commercial Standards Monthly. The demand for this publication has become so great (over 15,000 names are now on the mailing list) that permission has been obtained by the bureau to issue it in printed form.

In its new form the Monthly will contain brief statements of the current status of projects in the commercial standards field, commercial aspects and applications of the general standardization work of the bureau, references to similar work by other branches of the Federal Government, important achievements of national standardizing bodies outside the Government service, examples of waste elimination as affected by trade associations and individual companies, abstracts of articles which bear on national or regional standardization, brief accounts of work abroad where such is of interest to American business men, and certain miscellaneous items, such as notices of new publications and investigations which are of interest.

As a printed publication the Commercial Standards Monthly will record the progress of work in its particular field much as the Technical News Bulletin covers the field of research and testing.

The first number of the Commercial Standards Monthly will appear about July 15. It is obtainable on a subscription basis from the Superintendent of Documents, Government Printing Office, Washington, D. C., at $1 per year to addresses in United States and its possessions, Canada, Cuba, Mexico, Newfoundland, and the Republic of Panama; $1.25 to other countries.

TWENTY-SECOND NATIONAL CONFERENCE ON WEIGHTS AND MEASURES.

The Twenty-Second National Conference on Weights and Measures was held in Washington, June 4 to 7, inclusive. The attendance numbered 220, delegates being present from 25 States

and the District of Columbia. The sessions on the first two days were held at the bureau while those on June 6 and 7 took place at the Hotel Washington, the downtown headquarters of the conference.

The conference was opened with an address by Dr. George K. Burgess, Director of the Bureau of Standards and president of the conference. Doctor Burgess reviewed the status of Federal weights and measures legislation which has come before Congress since the last meeting of the conference, described weights and measures publications issued by the Bureau of Standards during the past year, and discussed the recent activities of the International Bureau of Weights and Measures, particularly as regards the international temperature scale, the alternate definition of the meter in terms of the red radiation of cadmium (1 meter=1,553,164.13 waves), and the probable adoption of 20° C. (68° F.) as the standard temperature for shop standards of length. He also referred to the initial steps which have been taken to bring into agreement the electrical, thermal, and mechanical units.

On June 5 an address was delivered by the Secretary of Commerce, Hon. Robert P. Lamont, in which he pointed out the valuable work accomplished by the conference for the entire country through the exchange of ideas from the representatives of various States and cities. Without any regulatory power, and without in any way infringing upon the jurisdiction of the local governments, a high degree of uniformity in weights and measures regulation has been brought about.

One of the most interesting papers presented was that of Herbert L. Anderson, chief examiner of the Federal Trade Commission, who described what the commission is doing to eliminate unfair practices in weights and measures in interstate commerce. He spoke particularly of the elimination of packages correctly labeled, but of unusual weight, such as 15 ounces instead of 1 pound, which have a tendency to deceive the purchaser, misbranding of paint and textile materials, slack-filled packages, etc. Closer cooperation between the State and city weights and measures officials and the commission was urged by Mr. Anderson.

Another paper of special interest was that of John Holmes, vice president of Swift & Co., who described the unusual conditions which must be met by weighing devices in a large, modern packing plant. At every stage of the process from the receipt of the animals at the stockyards to the distribution of the finished product, scales are used, and the requirements are often severe. Many different types of scales are employed, depending upon the weight of material, time available for weighing, order of accuracy needed, etc. In some cases corrosion is a serious problem and constant attention is needed to maintain the scales at the high efficiency required.

B. W. Ragland, chief of the bureau of weights and measures of Richmond, Va., described an unusual gasoline meter installation in a ramp garage, in which novel methods had to be employed to insure accuracy in the registration of meters on the different floors.

Papers presented by members of the bureau's staff included one on the repair of heavy-capacity scales (National Scale Men's Association Bulletin No. 1, written by C. F. Howkinson, president of the above association, who could not be present), by H. M. Roeser; identification by linear measurement, by W. H. Souder; a method for investigating short deliveries of fuel oil, by E. L. Peffer; the solution of air in gasoline, by O. C. Bridgeman; and the legal status of rules and regulations as established by decisions of the courts, by William Parry.

The conference adopted a number of amendments to codes of specifications and tolerances for commercial weighing and measuring devices which had been previously acted upon. Final action was taken in adopting specifications and tolerances on grease-measuring devices, the code on this subject having been tentatively adopted last year.

At 12.30 p. m. on June 6 the delegates were received by President Hoover, and

a special trip through the White House for the ladies of the party was arranged for the morning of the same day.

CONFERENCE OF STATE UTILITY COMMISSION ENGINEERS

The seventh annual conference of State Utility Commission Engineers was held at the bureau May 31 and June 1. The conference was attended by 27 engineers representing 19 States and 2 Provinces of Canada—Quebec and Ontario. That these conferences are becoming well known and appreciated is shown by the wide representation from the States, including California, Oklahoma, North Dakota, Minnesota, Iowa, Wisconsin, Alabama, and Florida, in addition to the Eastern States, including 4 of the New England States.

The program was arranged by an executive committee of four: A. G. Mott, chief engineer, California Railroad Commission, chairman; I. F. McDonnell, chief engineer, Alabama Public Service Commission; Philander Betts, chief engineer, New Jersey Board of Public Utility Commissioners; and J. Franklin Meyer, Bureau of Standards, secretary. The following committee reports and technical papers were presented:

1. Committee Reports.—Uniform types of rates and rate schedules, A. V. Guillou, assistant chief engineer, California Railroad Commission, chairman; charges for fire protection, Philander Betts, chief engineer, New Jersey Board of Public Utility Commissioners, chairman; depreciation, A. B. Greene, telephone engineer, Railroad Commission of Florida, chairman; standard rural line construction and costs, J. Howard Mathews, assistant chief engineer, Illinois Commerce Commission.

2. Technical Papers.—Street lighting rates, W. M. Black, electrical engineer, Pennsylvania Public Service Commission; rise and fall of prepayment gas meters (an obituary), and overhead wiring and radio antennas, Philander Betts, chief engineer, New Jersey Board of Public Utility Commissioners; rural electrification, George Charlesworth, electrical engineer, Iowa Railroad Commission; long-distance manufactured gas transmission, M. T. Bennett, gas engineer, Wisconsin Railroad Commission; branch-line and switching transportation problem, R. H. Nexsen, deputy chief engineer, New York Public Service Commission; State regulation of common carrier motor bus, J. P. Wadhams, transportation engineer, Connecticut Public Utilities Commission; electric service rules, J. Franklin Meyer, Bureau of Standards.

The engineers attending these conferences have found them very useful and valuable, not merely from the committee reports and papers presented and discussed, but even more so from the personal contacts established and the opportunity afforded to compare experiences and interchange information as to the manner in which the engineering departments of the commissions handle their problems. The proceedings of the conference are not published, but a small number of copies of the committee reports and papers are available, and will be sent to commission engineers upon application, as long as the supply lasts.

The committee elected to take charge of the 1930 conference consists of Philander Betts, chief engineer, New Jersey Board of Public Utility Commissioners, chairman; A. G. Mott, chief engineer, California Railroad Commission, vice chairman; George Charlesworth, electrical engineer, Iowa Railroad Commission; and J. Franklin Meyer of the Bureau of Standards as secretary.

SPECTRUM OF CHLORINE

Valuable additions to our knowledge of the spectrum of chlorine, an element whose spectral characteristics have been practically unknown heretofore, and data tending to show that so far as we are now aware, chlorine does not exist in the sun, were made available to physicists and astronomers through a report published in the June number of the Bureau of Standards Journal of Research.

Several years ago Prof. H. Kayser, of the University of Bonn, in reviewing the

research work done on the spectrum of the gas chlorine made the statement that, in spite of all the investigations that had been made up to that time, the spectrum was still practically unknown. The cause for this situation lies in the fact that chlorine is a difficult element to observe spectroscopically. When an electric discharge is passed through the gas at reduced pressure in a glass tube it rapidly enters into chemical combination with the hot metal electrodes and the discharge tube soon becomes useless. This defect has been eliminated in an experimental procedure at the bureau, whereby a small portable chlorine generator is attached to the discharge tube, thus permitting small amounts of the gas to be admitted to the tube to replace that which has combined with the electrodes.

With such a tube it was possible to produce the spectrum of chlorine for the long periods of time (up to 15 hours) necessary to photograph it in the regions where it had never previously been observed. As a result of this new investigation our knowledge of the spectrum has been extended from the wave lengths visible to the eye in the violet and blue to those in the infra-red, beyond the limit of visibility, but capable of being photographed with specially sensitized plates.

Our modern theories of the structure of the atom enable us to predict the type of spectrum which the atom will radiate when it is losing the energy imparted to it, say, in an electric discharge. These new spectrum lines have been classified into spectral series and it is found that these conform in every detail to the theoretical requirements. From this classification we may calculate the actual amount of energy required to put into the chlorine atom in order that it may radiate the various spectrum lines which characterize it. The chlorine atom has seven valence electrons and the amount of energy required to separate one of these from the atom proves to be 13 volts.

For some time astrophysicists have thought that some of the unknown lines of the sun's spectrum might be identified with those of chlorine when these became known. It is now possible to state that chlorine, if it exists in the sun, is not revealed by the presence of its spectrum lines among those of the Fraunhofer spectrum.

NEW METHOD FOR DETERMINING GASOLINE CONTENT OF NATURAL GAS

The bureau has developed a new precise method for determining the amount of gasoline present in an untreated natural gas and the amount remaining in the treated gas.

Motor gasoline is produced in three ways. It is obtained from crude oil by straight refining methods; from petroleum distillates by so-called cracking processes; or from natural gas by compression-cooling, absorption, and adsorption processes. Gasoline extracted from natural gas is a high-grade condensate which is not marketed as a separate product, but is blended with cracked and refinery gasolines. Over 9 per cent of the total amount of gasoline produced in this country is "natural gasoline," and its market value in 1926 was over $136,000,000.

Unfortunately, much of the natural gasoline present in natural gases is not recovered by present methods of recovery, and engineers are endeavoring to improve the operation of extraction plants. But in order to determine plant efficiencies it is necessary to know how much gasoline occurs in an untreated gas and how much is left in the treated gas. Again, unfortunately, field and laboratory methods of test in common use are not capable of giving this information with sufficient accuracy.

The bureau has developed a method to meet this particular need of the natural-gas industry. This method employs an isothermal distillation of the natural-gas mixture and a system of recombination of various fractions, with measurements of their saturation pressures. It is accurate to within 10 gallons of condensate per million cubic feet of gas.

In order to attain this accuracy with the small gas samples used it was necessary to measure a volume of gasoline as small as three ten-millionths of a gallon and to employ temperatures as low as 347° below zero (Fahrenheit).

A complete description of the method has just been published in the June number of the Bureau of Standards Journal of Research.

VOLATILITY DATA ON NATURAL GASOLINE AND BLENDED FUELS

The growth of the natural gasoline industry, based on the recovery of highly volatile gasoline from natural gas, has led to the more widespread blending of natural gasoline with ordinary refinery gasoline, resulting in the marketing of many fuels which are more volatile than those hitherto studied in the investigation of gasoline volatility at the Bureau of Standards. In order to study these more volatile fuels, an apparatus was constructed for making measurements at temperatures down to 40° below zero, and experiments were made on a large number of gasolines at these low temperatures. The general conclusion reached was in agreement with that found previously, that the volatility of any gasoline may be obtained from the usual distillation test used by the oil refiners.

Since addition of natural gasoline to a motor fuel increases the ease with which it will start an automobile engine, this work shows the refiner just how much natural gasoline must be added to ordinary gasoline to enable the motorist to start an engine under various climatic conditions. Ether is frequently used in very cold climates for starting airplane engines and some work was done on various mixtures of ether and aviation gasoline. This shows that whereas aviation gasoline, such as the Army ordinarily uses, will start the airplane engine only at temperatures above zero, a mixture in equal parts of ether and gasoline should permit starting at about 40° below zero. Ether-gasoline blends are desirable only for starting, since the addition of ether to gasoline greatly increases its tendency to knock.

FIRE-HAZARD TEST OF WOODEN LABORATORY TABLE

Fire hazard tests on a wooden laboratory table were made by the bureau at the request of the Board of Education and the fire department of the District of Columbia.

In selecting laboratory equipment for the new McKinley Technical High School, the question of the fire hazard of wooden tables was brought up by the fire department and a complete table which had been in use for several years in one of the schools was submitted for test. A Bunsen burner was overturned on the top of the table and the flames were allowed to spread or burn themselves out without interference. Five separate tests were made under conditions as nearly representative as possible of those that might occur in actual use. The entire table was consumed by the flames during the last test. Flame penetration tests were made on several small specimens of yellow pine and maple to determine the relative rate of burning of the two woods.

The fire hazard of wooden laboratory tables is dependent upon the design and the conditions of use. The least hazardous type of table would be one without reagent rack or drawers. In the tests made representative of this type flames from the burner charred a hole in the top, but did not spread to any appreciable extent beyond the edge of the burner flames. When books and papers were placed on the top and the flames allowed to impinge against them, the spread of the fire was greater, and a considerable portion of the corner of the table was burned. Several embers of a size sufficient to ignite a combustible floor dropped from the table.

The most hazardous type of table would be one with a reagent rack and a stack of drawers underneath. While tests representative of the one with a reagent rack were not made, one was made in which the burner flame was directed downward on the table top directly above a stack of drawers. After the flames had burned through the top, the light wood of the drawers ig-

nited and the flames continued to spread until the entire table was completely consumed.

The flame-penetration tests indicated that pine table tops did not constitute a greater hazard than maple table tops.

The tests showed that wooden laboratory tables without drawers beneath or reagent rack, books, or other combustible materials on top, do not present a serious fire hazard, particularly where placed on incombustible floors.

EFFECT OF ACIDITY OF PAPER

As a part of its study of permanence of paper, the bureau has recently completed a series of tests of commercial writing papers, made to find the relation between the acidity of the papers and their stability, as judged by the heat test. The acidity was determined for the papers as received and after they had been heated 72 hours at 100° C. The acidity was determined by the Kohler-Hall method used by the Swedish Government Testing Institute. The investigators at that institute concluded that acidity from the rosin sizing, or internal acidity, adversely affects the permanence of paper, while the "external acidity," or that caused by surface sizing the paper, has little effect. They place the desirable limit for the internal acidity of permanent papers at 25.

While few of the papers examined by the Bureau of Standards contained excessive acidity, the results obtained are in agreement with those of the Swedish institute. For example, two rosin-sized papers made of high-grade raw materials had acid numbers of 30 and 34, and decreased 5.6 and 3.4 per cent in alpha cellulose when subjected to the heat treatment. This excessive decrease in alpha cellulose did not occur in the case of similar papers of lower acidity. Apparently the acidity limit of 25 is well chosen. Furthermore, the fact that the glue-sized papers had considerably higher acidities than the unsized papers corresponding to them, and yet showed a higher degree of resistance to the artificial-aging treatment, indicates that the conclusion of the Swedish institute respecting the effect of internal acidity is well founded.

It was noticed that the heat treatment increased the acidity of the papers. Although it is very probable that the degradation products of cellulose, resulting from the heating of a paper, have an acid reaction, additional work will be necessary before it can be fully understood just why the acidity of papers should increase on being heated, and also why this increase should take place in materials of highest permanence, as well as in materials of much inferior quality, and to much the same extent. It was observed that this increase is about the same, or less, for the glue-sized papers than for the corresponding unsized papers. This would further seem to substantiate the conclusion that external acidity has no observable effect upon the rate of deterioration of papers.

SPOTTING OF PLATED OR FINISHED METALS

Many electroplated products, especially those that are plated with brass or are given an "oxidized" finish, show a tendency for the development of dark, unsightly spots on the surface. This defect, commonly known to the platers as "spotting out," has at times proven very serious in certain industries, such as the manufacture of builders' hardware. The American Electroplaters' Society, composed of foremen electroplaters, collected from their members and from firms engaged in plating, funds for researches on electroplating at the Bureau of Standards, and selected "spotting out" as the first problem for study.

The investigation has shown that there are two entirely distinct types of spotting. The "crystal spots" appear as dark radiating crystals upon metals that have a finish of copper sulphide (the so-called "oxidized" finish), and that are subsequently lacquered. The "stain spots" appear principally upon cast metals, in the form of irregular areas of variable color.

The crystal spots are caused by the absorption of minute amounts of sulphur or sulphur compounds from the

surroundings. Free sulphur (which may be used in certain plant operations), rubber bands, or wrapping paper or cartons containing small amounts of sulphur may cause this defect to develop. The only effective remedies are (1) the application of a lacquer which is most nearly impervious to sulphur, (2) the application of a very thin film of grease to the lacquered surface, and (3) the use of wax paper for wrapping the articles.

The stain spots result from the presence of minute pores in the metal, and the absorption in these pores of chemicals, either acid or alkaline, during the operations of cleaning and plating. When such articles are subsequently exposed to an atmosphere with high humidity, moisture is absorbed by the materials in the pores, which then exude and stain the surrounding metal.

Some improvement can be made by using less porous castings and by allowing the chemicals to "spot out" from the pores before the final finishing. The most effective remedy is the application of such lacquers as have been found to retard or prevent the spotting. Lacquers submitted by many manufacturers were tested, and some were found to be much more effective than others. Additional studies by lacquer manufacturers will no doubt lead to further improvements.

A more complete account of this investigation has just been published in the June number of the Bureau of Standards Journal of Research.

REFERENCE LABORATORY FOR PORTLAND CEMENT

An important recent development is the establishment at the bureau of a reference laboratory for the testing of Portland cement, calibration of machines and instruments used in cement testing, and the training of men for commercial cement-testing laboratories.

The new laboratory is supported jointly by the American Society for Testing Materials and the Federal Government. Its work is under the immediate supervision of P. H. Bates, chief of the clay and silicate products division of the Bureau of Standards.

The esablishment of this new laboratory is the outgrowth of a plan originally formulated by the cement committee of the American Society for Testing Materials. Frederick W. Kelly, president of the North American Cement Corporation, as spokesman of the cement industry, addressed a letter to Mr. Bates, chairman of the cement commitee of the A. S. T. M., on September 15, 1928, calling attention to the need of such a laboratory. In this letter Mr. Kelly said:

> There are produced annually in the United States about 170,000,000 barrels of Portland cement. Substantially all this cement is made to conform to the standard specifications for Portland cement which have been adopted by the American Society for Testing Materials, by the United States Government departments, and by the principal users of Portland cement in the United States.
>
> It is necessary that all this cement be tested to make certain that it does conform with the standard specifications, and it is important that such tests be made to insure the integrity of the structures in which the cement is used. It is of vital importance to both the user and the manufacturer of cement that the tests be accurate and that the results of tests on the same sample by two laboratories be the same.
>
> There are in the United States to-day probably 300 cement-testing laboratories. Several series of carefully conducted tests have shown a lamentable lack of concordance in the results obtained, even among the best of them. Differences of 100 per cent in results are not unusual. This introduces a most undesirable element of uncertainty into both the technical and the commercial ends of the cement industry, and is interfering with its development.
>
> Printed information and instructions have been made available to all interested in an unsuccessful effort to secure better results. It is believed that personal inspection and instruction are needed to secure a proper appreciation by all laboratories of the importance of machine calibration and exact compliance with specified conditions and methods. There is to-day no recognized authority equipped to give this inspection, instruction, and advice.
>
> We propose to establish at the United States Bureau of Standards at Washington a fellowship to be known as "Reference Laboratory for Standard Cement Testing." Under this fellowship establish a laboratory with apparatus and personnel capable of making tests or Portland cement in strict conformance with the specifications. This laboratory

staff to be prepared to instruct on proper methods of making tests and maintaining testing equipment, also to calibrate all equipment submitted by laboratories as purchasers or by manufacturers of said equipment.

As the result of this letter the details were worked out for the establishment of the desired laboratory under the Bureau of Standards research associate plan. The staff will consist of five experts, three of whom are already at work. This laboratory staff is prepared to give instruction on established methods of testing and on the proper maintenance of testing equipment, and will also calibrate such equipment submitted by purchasers or manufacturers.

Tests will be made of Portland cement in strict conformance with the standard specifications and tests of the American Society for Testing Materials. For the present it is planned to confine the work to physical testing.

The instruction to be given by the laboratory staff will be of two kinds, one in the laboratory in Washington and the other in the field:

1. In Washington detailed instruction will be given in the making of test specimens and in the methods of testing. Instruction will also be given in the maintenance of testing equipment and in checking the calibration of equipment.

2. In the field the instruction will consist principally of criticism of methods and conditions noted in each laboratory visited, and suggestions will be given for improving them. At the same time testing equipment in the laboratory visited will be calibrated where possible and instruction given in proper maintenance of equipment.

The service will be available upon application only and will be rendered as nearly as possible in the order in which applications are received. Instruction in Washington may be expected to occupy two or more weeks, depending upon the aptitude of the men sent for training.

The schedule of the laboratory representatives giving instruction in the field must obviously be arranged by routes to avoid unnecessary traveling. A couple of days only can be allotted to each laboratory on each visit.

Application for service should be made to Cement Reference Laboratory, care Bureau of Standards, Washington, D. C.

It is the intention of the laboratory to issue certificates covering machines tested by it. These are all to be issued from Washington, and the fees charged for these services will be in accordance with the schedules for similar work now in force at the bureau. The money obtained will be deposited in the United States Treasury and will not be available for expenditure.

A special committee of the main committee on cement of the American Society for Testing Materials has been appointed to cooperate with the Bureau of Standards in conducting the work of the reference laboratory.

IMPROVED CHINAWARE-TESTING MACHINE

A modified impact machine for chinaware has been designed and built at the bureau to obviate certain difficulties encountered in the use of a similar testing machine specified in the United States Government Master Specification for Vitrified Chinaware, No. 243a.

The modified testing machine, as was specified, is a pendulum apparatus. The modified type machine has only one steel cylindrical hammer (3½ inches long by ⅝ inch diameter) weighing 5 ounces and suspended by eight piano steel wires (0.01 inch in diameter). Because of its manner of suspension, this pendulum swings in a vertical plane in an arc having a 24-inch radius, thus eliminating one of the objectionable features of the specified machine. One face of the new hammer is a spherical surface (½-inch radius) used to make impact tests, while the other is a cylindrical surface (½-inch radius) used to make chipping tests. In using the specified machine it was necessary to use hammers of different size, shape, and weight for each test.

A steel scale which is a 90° segment of a 24-inch radius circle is fastened by two rigid arms to the supporting frame at the lower end of the arc through which the pendulum swings. The scale is graduated in divisions representing fractions of a foot-pound. Notches, each one representing an increment of 0.01 foot-pound, are cut into the scale to hold a pendulum releasing device in position. The specified machine used two scales (10-inch radius), one for each

hammer, fastened to the frame at the upper end of the pendulum. The larger scale of the modified machine obviously has the divisions farther apart, and is therefore much easier to read than the scale of the specified machine. The pendulum and scale of the modified machine may be raised or lowered by means of a threaded rod and two handwheels.

The cast-iron base plate, upright casting, the steel ring, and triangular blocks are essentially the same as used on the specified machine; however, the upright casting is more quickly moved by means of a threaded rod and crank in the modified machine.

In order to make a comparative study of the specified and modified machines, 33 brands of chinaware were received from 28 manufacturers and importers and tested for impact and chipping on both machines. The samples represented 28 different brands of domestic and 5 of foreign-made ware. From the data it appears that there is practically no difference in the values obtained on the specified and modified type machines.

CHANGE OF VOLUME DURING USE OF BURNED CLAY BODIES

The Columbus branch of the bureau is conducting an investigation of the change of volume of burned clay bodies resulting from the autoclave treatment. Throughout the investigation a steam pressure of 150 lbs./in.^{2} has been used. Semivitreous bars burned to cone 5+ were first studied by subjecting them to six autoclave treatments for one hour. Before each measurement the bars were dried for 24 hours at 110° C. The average increases in length were as follows: At the end of the first treatment, 0.089; second treatment, 0.108; third treatment, 0.127; fourth treatment, 0.145; fifth treatment, 0.159; sixth treatment, 0.158 per cent, respectively. Weight changes studied indicated a similar rate of increase.

The effect of pressure without heat or water was studied by subjecting the glazed specimens to a pressure of 150 lbs./in.^{2} with compressed CO_2. No crazing resulted except when the glaze was very thick and then only a few craze cracks appeared. Heating at 185° C. produced no permanent increase in length, nor was any change obtained with a combination of heat and pressure without water. This indicates that the changes in length result from the presence of water.

The autoclave treatment, followed by cooling under steam pressure, gave a much greater increase in weight than did cooling under air pressure. However, the length changes were approximately the same in both cases.

It was found that the purely physical effect of filling the pores of the specimen with water was a minor factor in causing an increase in volume.

The bars, which had previously been given six successive autoclave treatments, were dried at 110° C. for a total of 40 days with measurements taken at different times. The average length in terms of the original was: At the end of 1 day drying, 0.158; 9 days drying, 0.109; 13 days drying, 0.095; 20 days drying, 0.076; 33 days drying, 0.057; and 40 days drying, 0.057 per cent. There is practically no change after 33 days drying. A study of weight changes gave similar results, except that the loss was much more rapid and became practically constant from 13 to 20 days. Thus, there is a lag of the volume change as compared to the weight change.

Several bars were next subjected to the action of various liquids at elevated temperatures. The liquids used were all immiscible with water, but were heated at nearly their boiling point for from two to four hours before the bars were put in, thus driving off any small amount of water which might have been present. A reflux condenser set-up was used, and the changes in length noted on treatment for several hours. With all the liquids used (paraffin, xylene, kerosene, and petrolatum) a positive increase in length was obtained in every case. These data strongly point to the probability that the change in length is not the result of hydration.

DIRECTORY OF GOVERNMENTAL TESTING LABORATORIES

As a result of a request from the War Department, the Chief Coordinator has arranged for the preparation by the bureau of a classified list of all governmental laboratories, facilities, etc., available for the testing of supplies and materials for the purchasing officers of the various Government departments.

Questionnaires for use in compiling data relating to the kinds of commodities which the various Government department laboratories can test and the types of testing equipment in the laboratories were submitted to the chief purchasing officers of the departments and establishments. These officers were thus informed of the proposed compilation and were able to check the accuracy of the bureau's mailing list of Government testing laboratories.

The Directory of Governmental Testing Laboratories will supplement the Directory of Commercial Testing and College Research Laboratories (Bureau of Standards Miscellaneous Publication No. 90), now in its second edition. Information will be given concerning not only the kinds of commodities which each laboratory can test, but also the types of testing equipment in each laboratory, and the routine procedure involved in obtaining authority for the laboratory to assist purchasing officers in making tests, and furnishing results relating thereto.

On account of the great amount of available information relating to the testing facilities of the laboratories of the several departments of the Government, the laboratories directory will be considerably more elaborate than was at first expected. The major part of the manuscript for the directory has been placed in final form for mimeographing.

RADIO SIGNAL TRANSMISSIONS OF STANDARD FREQUENCY, JULY TO DECEMBER

The bureau announces a new schedule of radio signals of standard frequencies, for use by the public in calibrating frequency standards and transmitting and receiving apparatus. The signals are transmitted from the bureau's station WWV, Washington, D. C. They can be heard and utilized by stations equipped for continuous-wave reception at distances up to about 1,000 miles from the transmitting station.

The transmissions are by continuous-wave radiotelegraphy. A complete frequency transmission includes a "general call" and "standard frequency" signal, and "announcements." The "general call" is given at the beginning of the five-minute period and continues for about two minutes. This includes a statement of the frequency. The "standard frequency signal" is a series of very long dashes with the call letter (WWV) intervening. This signal continues for about four minutes. The "announcements" are on the same frequency as the "standard frequency signal" just transmitted and contain a statement of the frequency. An announcement of the next frequency to be transmitted is then given. There is then a four-minute interval while the transmitting set is adjusted for the next frequency.

Information on how to receive and utilize the signals is given in Letter Circular No. 171, which may be obtained by applying to the Bureau of Standards, Washington, D. C. Even though only a few frequency points are received, persons can obtain as complete a frequency meter calibration as desired by the method of generator harmonics, information on which is given in the letter circular. The schedule of standard frequency signals is as follows:

July 22, 10 p. m., E. S. T., 1,500; 10.12, 1,700; 10.24, 2,000; 10.36, 2,300; 10.48, 2,700; 11, 3,100; 11.12, 3,500; 11.24, 4,000.

August 20, 10 p. m., E. S. T., 4,000; 10.12, 4,400; 10.24, 4,800; 10.36, 5,200; 10.48, 5,800; 11, 6,400; 11.12, 7,000; 11.24, 7,600.

September 20, 10 p. m., E. S. T., 550; 10.12, 600; 10.24, 700; 10.36, 800; 10.48, 1,000; 11, 1,200; 11.12, 1,400; 11.24, 1,500.

October 21, 10 p. m., E. S. T., 1,600; 10.12, 1,800; 10.24, 2,000; 10.36, 2,400;

10.48, 2,800; 11, 3,200; 11.12, 3,600; 11.24, 4,000.

November 20, 10 p. m., E. S. T., 4,000; 10.12, 4,400; 10.24, 4,800; 10.36, 5,200; 10.48, 5,800; 11, 6,400; 11.12, 7,000; 11.24, 7,600.

December 20, 10 p. m., E. S. T., 550; 10.12, 600; 10.24, 700; 10.36, 800; 10.48, 1,000; 11, 1,200; 11.12, 1,400; 11.24, 1,500.

NEW AND REVISED PUBLICATIONS ISSUED DURING MAY, 1929

Journal of Research [1]

(Bureau of Standards Journal of Research, Volume 1 (RP Nos. 1 to 36), bound in cloth, $2.75, (foreign, $3.50).

Bureau of Standards Journal of Research, Vol. 2, No. 5, May, 1929 (RP Nos. 60 to 66, inclusive). Obtainable only by subscription. (See footnote.)

Research Papers [1]

(Reprints from Journal of Research)

RP60. Continuous spectrum X rays from thin targets; W. W. Nicholas. Price, 10 cents.

RP61. A multiple-strand test for yarns; C. W. Schoffstall and H. A. Hamm. Price, 10 cents.

RP62. Thermal expansion of tantalum; P. Hidnert. Price, 5 cents.

RP63. Soundproofing of airplane cabins; V. L. Chrisler and W. F. Snyder. Price, 5 cents.

RP64. Prism refractometry and certain goniometrical requirements for precision; L. W. Tilton. Price, 10 cents.

RP65. A new determination of the melting point of palladium; C. O. Fairchild, W. H. Hoover, and M. F. Peters. Price, 10 cents.

RP66. A new seismometer equipped for electromagnetic damping and electromagnetic and optical magnification (theory, general design, and preliminary results); F. Wenner. Price 15 cents.

Technologic Papers [1]

Technologic Papers of the Bureau of Standards, Volume 22 (Nos. 353 to 370), bound in cloth, $3.

Simplified Practice Recommendation [1]

R95–28. Skid platforms. Price, 5 cents.

Commrcial Standards [1]

CS4–29. Staple porcelain (all-clay) plumbing fixtures. Price, 10 cents.

United States Government Master Specifications [1]

USGMS. 39c. Tubing, rubber. Price, 5 cents.

USGMS. 48c. Hose, water and wash deck. Price, 5 cents.

USGMS. 50b. Hose, suction, water (smooth bore). Price, 5 cents.

USGMS. 63c. Hose, oil suction and discharge. Price, 5 cents.

USGMS. 111b. Packings and gaskets, rubber (molded, sheet, and strip). Price, 5 cents.

USGMS. 497a. Wool bunting. Price, 5 cents.

USGMS. 588. Hose, water, braided. Price, 5 cents.

USGMS. 618. Lamps, electric, incandescent, miniature, tungsten filament. Price, 5 cents.

1930 Supplement to USGMS. 618. Price 5 cents.

Miscellaneous Publications [1]

M93. Visitors' manual of the National Bureau of Standards (a brief account of its history, functions, and laboratory facilities); H. G. Boutell. Free on application to the bureau.

M94. Scientific and technical positions in the National Bureau of Standards, W. C. Fewell. Free on application to the bureau.

Technical News Bulletin [1]

TNB146. Technical News Bulletin, June 1929. Obtainable only by subscription.[1]

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[1] Send orders for publications under this heading with remittance only to the Superintendent of Documents, Government Printing Office, Washington, D. C. Subscription to Technical News Bulletin, 25 cents per year (United States and its possessions, Canada, Cuba, Mexico, Newfoundland, and Republic of Panama); other countries, 40 cents. Subscription to Bureau of Standards Journal of Research, $2.75; other countries, $3.50.

OUTSIDE PUBLICATIONS [2]

Units of electrical measurement. G. W. Vinal; Paper presented at Toronto meeting of American Electrochemical Society (New York, N. Y.); Preprint released April 30, 1929.

The effects on orifice meter indications of various pipe fittings near the orifice plate. H. S. Bean; Western Gas (Los Angeles, Calif.), Vol. V, No. 3, p. 30; March, 1929.

A survey of amalgam alloys: A report to the research commission of the American Dental Association. N. O. Taylor; Journal of the American Dental Association (Chicago, Ill.), Vol. XVI, No. 4, p. 583; April, 1929.

Vapor pressure data on motor gasolines. O. C. Bridgeman, E. W. Aldrich, and H. S. White; Society of Automotive Engineers' Journal (New York, N. Y.), Vol. XXIV, No. 5, p. 488; May, 1929.

Aeronautic research at the National Bureau of Standards; L. J. Briggs; Aero Digest (New York, N. Y.), Vol. 14, No. 4, p. 52; April, 1929.

Endurance flights. H. B. Henrickson; Aero Digest (New York, N. Y.), Vol. 14, No. 4, p. 38; April, 1929.

Altitude flights. H. B. Henrickson; Aero Digest (New York, N. Y.), Vol. 14, No. 5, p. 39; May, 1929.

Investigation for damping liquids for aircraft instruments. G. H. Keulegan; National Advisory Committee for Aeronautics (Washington, D. C.), Report No. 299; May, 1929.

Pressure element of constant logarithmic stiffness for temperature compensated altimeter. W. G. Brombacher and F. Cordero; National Advisory Committee for Aeronautics (Washington, D. C.), Report No. 310; May, 1929.

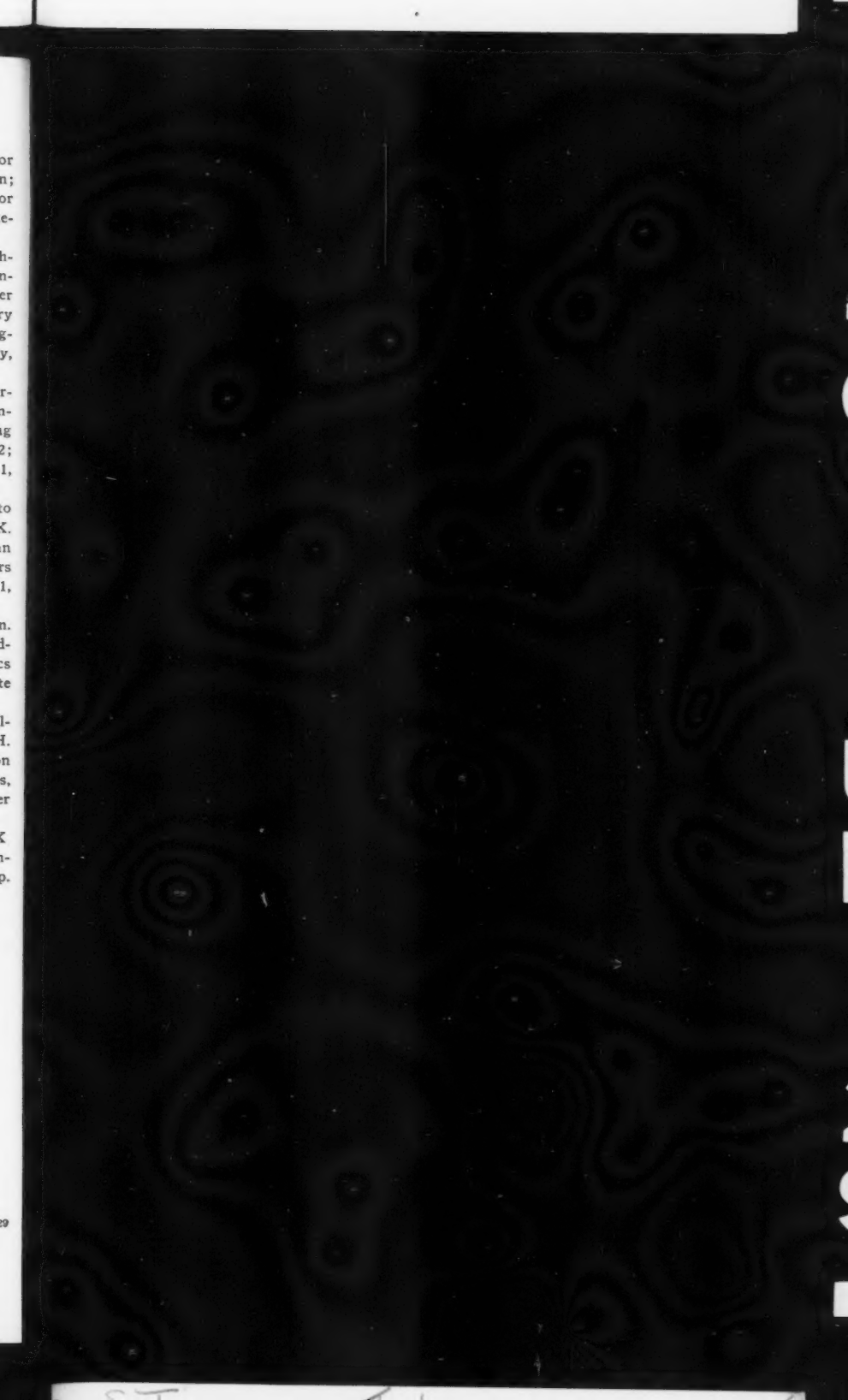
Envelope paper qualities and their determination. B. W. Scribner; the Envelope Industry (Flushing, Long Island, N. Y.), Vol. 2, No. 10, p. 12; December, 1928; and Vol. 3, No. 1, p. 9; March, 1929.

The corrosion problem as applied to power plants. H. S. Rawdon and K. H. Logan; Transactions, American Society of Mechanical Engineers (New York, N. Y.), Vol. 51, No. 1, p. 19; January–April, 1929.

Corrosive embrittlement of duralumin. VI. H. S. Rawdon; National Advisory Committee for Aeronautics (Washington, D. C.), Technical Note No. 305; May, 1929.

The sulphoaluminates of calcium. William Lerch, F. W. Ashton, and R. H. Bogue; Portland Cement Association Fellowship (c/o Bureau of Standards, Washington, D. C.) Research Paper No. 19; April, 1929.

This plant works miracles. George K Burgess; National Republic (Washington, D. C.), Vol. XVII, No. 2, p. 21; June, 1929.

[2] "Outside publications" are not for distribution or sale by the Government. Requests should be sent direct to publishers.

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